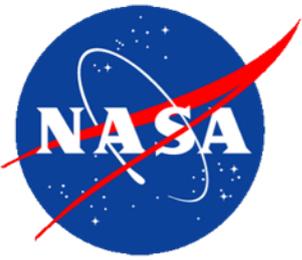


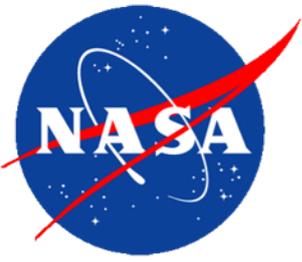
LUVOIR Study Science Support Analysis Team (SSAT)

Avi Mandell, GSFC (Lead)



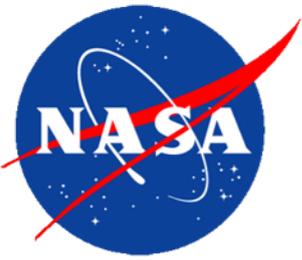
SSAT Mission and Relationship to STDT

- The SSAT is tasked with assisting the STDT on evaluating the performance of LUVOIR architectures for the key science priorities identified by the STDT itself
 - Goal: Aid in understanding the implications of design trades
- The SSAT will include GSFC scientists who have expertise in simulating future observatory performance in LUVOIR-related science areas
- The SSAT will coordinate with STDT members on priorities, and will engage external community members as needed



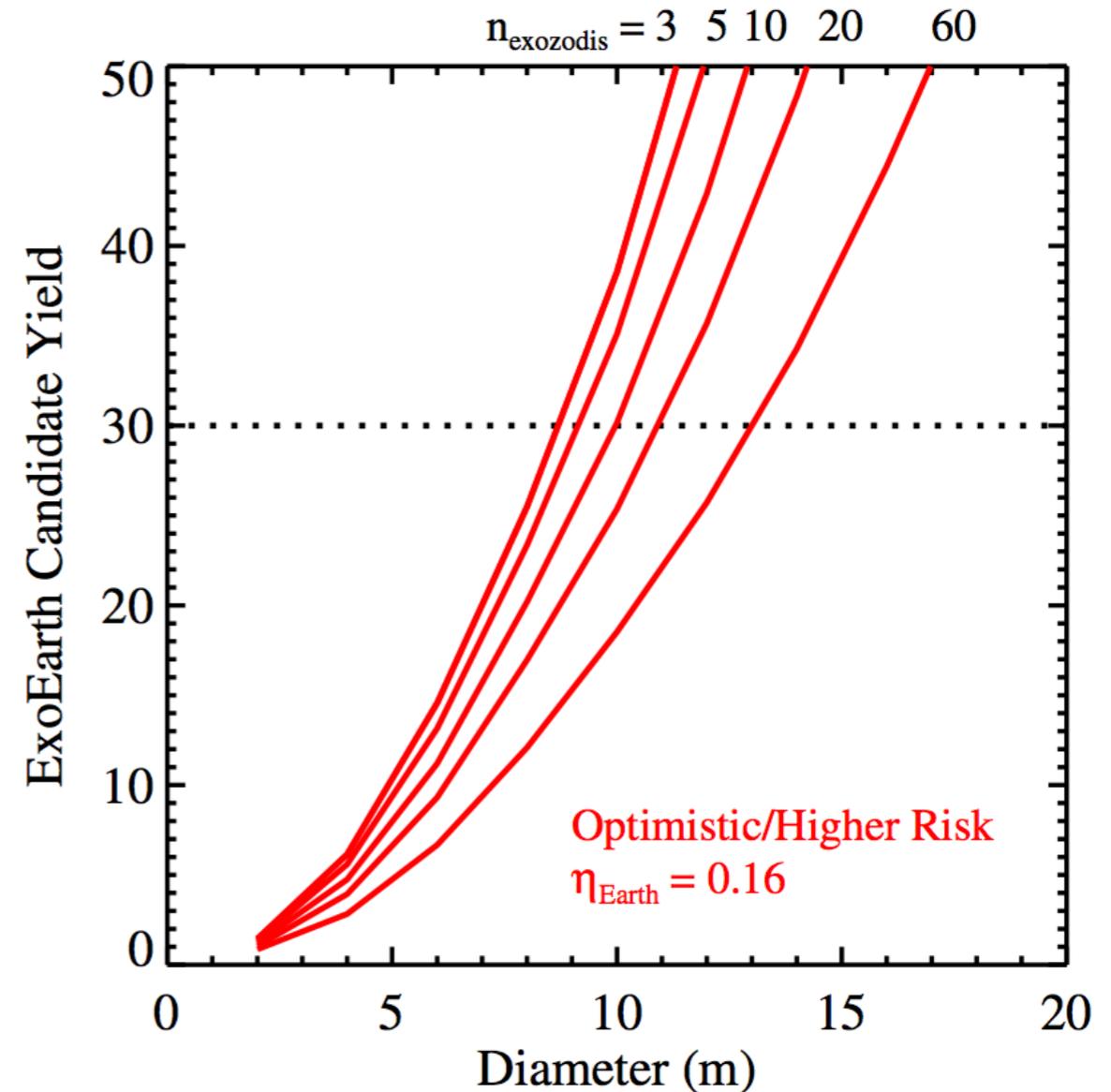
Current SSAT Members

- Avi Mandell (Exoplanets/Young Disks, Team Lead)
- Aki Roberge (Exoplanets/Debris Disks)
- Shawn Domagal-Goldman (Exoplanets)
- Geronimo Villanueva (Solar System)
- Jane Rigby (Extragalactic)
- Stefanie Milam (Solar System/ISM)
- Ravi Kopparapu (Exoplanets)
- Current waiting to reach out to new members after this meeting...

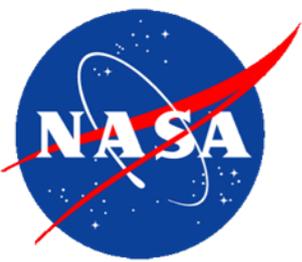


Examples of Possible Work

- Exoplanet Direct Imaging Detection and Science Yield Simulations
- Yield of Earth-like planets, other planet classes vs aperture, IWA
- Quality of characterization data vs telescope temperature, aperture

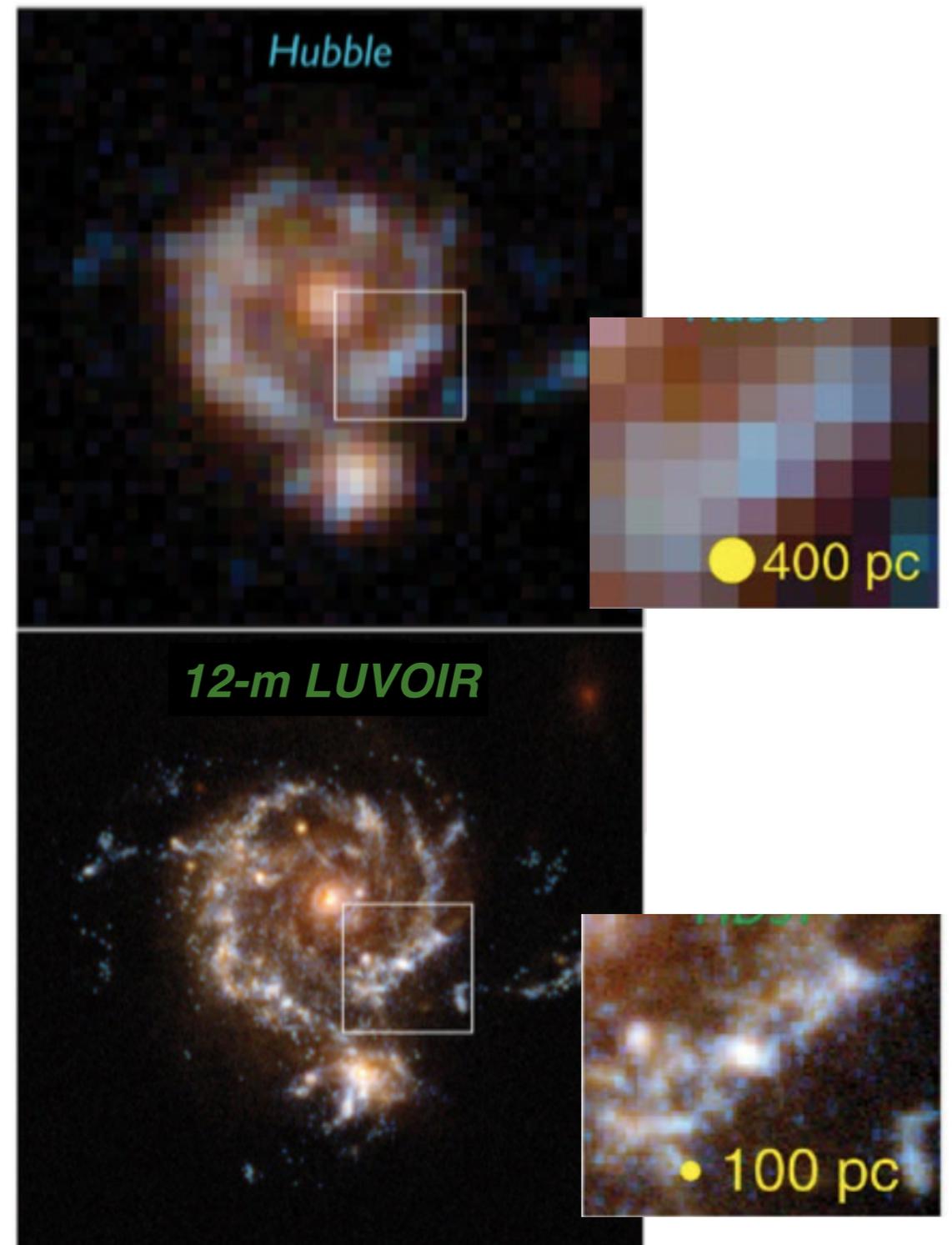


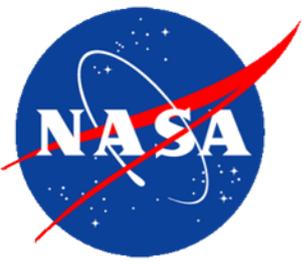
Stark et al. 2015



Examples of Possible Work

- Galaxy Evolution and Structure Simulations
- Star and galaxy formation with redshift versus aperture, diffr. limit
- Constraints on evolution of dark matter haloes as a function of spatial resolution



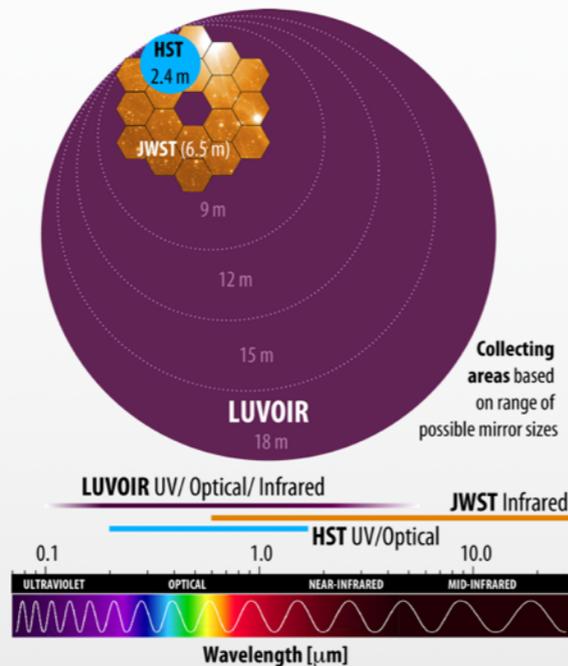


Initial Steps

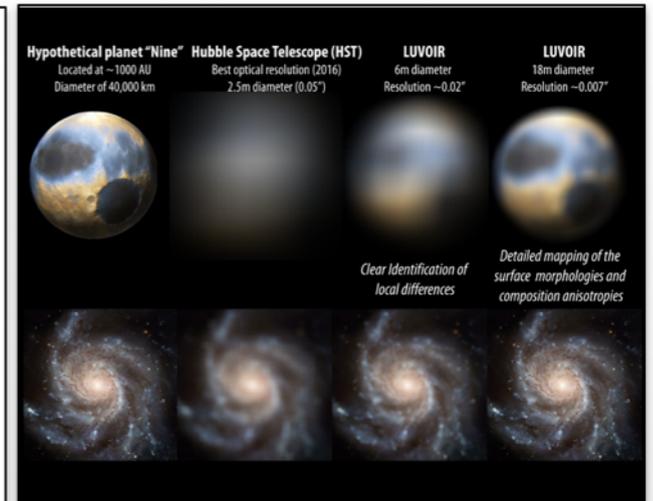
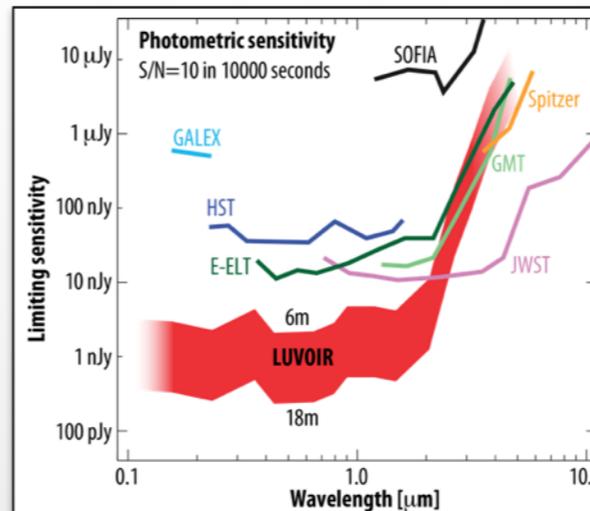
- Pre-meeting: Compile previous science cases, produce flyer on basic capabilities

NASA Large UltraViolet Optical and InfraRed surveyor (LUVOIR) A transformative leap in sensitivity and resolution

A large-aperture UV-Optical-IR space observatory capable of achieving revolutionary science goals was highlighted in the NASA 2013 Astrophysics Roadmap "Enduring Quests, Daring Visions" and the recent AURA Report "From Cosmic Birth to Living Earths". Below some key scientific capabilities of a LUVOIR-class facility are summarized. The mission concept will be defined through a community-led study, culminating in a report to the Astro2020 Decadal Survey.



- An extraordinarily large mirror aperture ($> 8\text{ m}$) and exceptional wavefront stability will permit unprecedented spatial resolution and coronagraphy.
- Broad wavelength coverage from the UV and reaching into the near-infrared will permit revolutionary multi-wavelength studies.



Limiting sensitivities: for a variety of current and near-future facilities. LUVOIR values are computed assuming a 280K temperature and for a range of telescope diameters (based on Dalcanton et al., AURA report, 2015).

A telescope targeting the UV-Optical-IR with a large aperture mirror will provide unprecedented **spatial resolution**, and – as shown in the figure – allow us to map the surfaces of distant planets in the Solar System and galaxies at large distances.

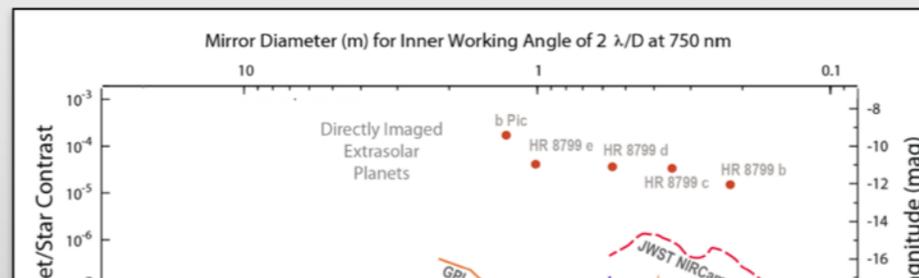
Astrophysics Exoplanets

LUVOIR's unprecedented resolution will resolve 1-parsec-sized star-forming regions of galaxies at distances up to 10-25 mega-parsecs, map the distribution of dark matter in the nearby universe, and isolate gravitational wave sources.

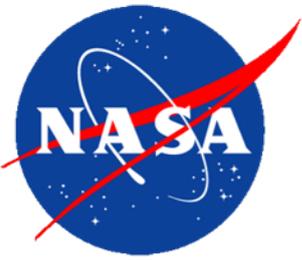


LUVOIR will enable astronomers to detect biomarkers on distant Earth-like worlds, analyze the structure and composition of non-Earth-like planets, and image faint circumstellar disks where planets are forming.

Cosmic Origins Solar System

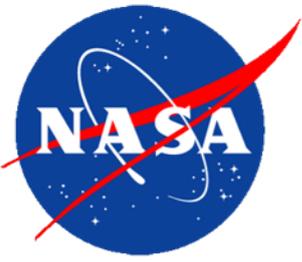


High-Contrast Exoplanet Imaging: Shown are the contrast limits (S/N=5) after post-processing one hour's worth of data for various coronagraph instruments. In the lower part of the plot, values for Solar System bodies



Initial Steps

- At this meeting: Meet STDT members and participate in break-out sessions and future science analysis planning
- Post-meeting:
 - Receive and digest initial list of top-level science priorities from this meeting
 - Determine where we (the SSAT) are deficient in terms of our science expertise, and recruit new members
 - Brainstorm new projects for improving our fidelity on the performance of the different LUVOIR architectures
- Start Work!



Working Groups w/ Leads

- Exoplanets - Mark Marley, Avi Mandell
- Cosmic Origins - John O'Meara, Jane Rigby
 - Need different sub-teams?
 - Daniella Calzetti - galaxies, Ilaria Pascucci - planet formation
- Solar System - Walt Harris, ?
- Technology - Dave Redding, Matt Bolcar
- Simulations - Jason Tumlinson, Aki Roberge